NOAA/NESDIS
POES Series
P220

NOAA-POES-IJPS/OSD-2002-0014R0UD0
October 30, 2002
DCN 0

POES IJPS

Polar-orbiting Operational Environmental Satellite (POES)

Initial Joint Polar-orbiting Operational Satellite System (IJPS) Ingestor to Preprocessor Interface Requirements Document

October 2002

Polar-orbiting Operational Environmental Satellite (POES)
Initial Joint Polar-orbiting Operational Satellite System (IJPS) Ingestor to Preprocessor Interface Requirements Document

October 2002

Prepared by:

U.S. Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite, Data, and Information Service (NESDIS)

Approval Page

Document Numbers:

NOAA/NESDIS
POES Series
P220

NOAA-POES-IJPS/OSD-2002-0014R0UD0
October 30, 2002
DCN 0

Document Title Block:

Polar-orbiting Operational Environmental Satellite (POES)

IJPS Ingestor to Preprocessor Interface Requirements Document

PROGRAM: POES IJPS

DOCUMENT RELEASE DATE: October 30, 2002

APPROVALS	
Approved by: Office of System Development DATE	Approved by: Office of System Development DATE
Michael Mignogno 10/30/02	*H J Silva* 10/30/02
NAME: Mike Mignogno, Polar Program Manager	NAME: H. James Silva, POES/IJPS Project Manager
Approved by: Office of Satellite Data Processing and Distribution DATE	Prepared by: Computer Sciences Corporation DATE
Barbara A. Banks 10/30/02	*D J Morel* 10-30-02
NAME: Barbara A. Banks, Chief	NAME: David J. Morel

CCB RELEASE APPROVAL: **DATE**

10/18/2002

NAME: Pong Yu

Document Change Notice

DCN NO.: **0**	DATE: **October 30, 2002**	PROGRAM : SYSTEM: **POES : IJPS**	PAGE NO.: **1** of **1**

DOCUMENT TITLE: ***Polar-orbiting Operational Environmental Satellite (POES) IJPS Ingestor to Preprocessor Interface Requirements Document***

DOCUMENT NO. **NOAA-POES-IJPS/OSD-2002-0014R0UD0**

CHANGE PAGE HISTORY			
No.	Page Number(s)	Update Instructions (Insert / Delete / Replace)*	Reason for Change
0	Complete Document	Original baseline version of this document	As presented at the NOAA SRR and updated to reflect all Review Item Discrepancies from the SRR Review Board.

COMMENTS: This is the first publication of this document; as such, it comprises the DCN 0 baseline.

NOTES:

*EXAMPLES: An *Insert change pages 6.2-6 through 6.2-9 following page 6.2-5*
          A *Replace pages 3.4-1 through 3.4-10 with change pages 3.4-1 through 3.4-10b*
          A *Replace page 4.5-24 with change page 4.5-24; delete pages 4.5-25 through 4.5-30*

Version Description Record

DOCUMENT TITLE:					
Polar-orbiting Operational Environmental Satellite (POES) IJPS Ingestor to Preprocessor Interface Requirements Document					

DOCUMENT NUMBER: Baseline: NOAA-POES-IJPS/OSD-2002-0014R0UD0		SYSTEM: POES IJPS		DOCUMENT BASELINE ISSUE DATE: October 30, 2002	

DOCUMENT CHANGE HISTORY					
DCN No.	Revision/Update Nos.	Date	DCN No.	Revision/Update Nos.	Date
0	R0UD0	October 30, 2002			

NOTES:

Preface

This document comprises the NOAA/NESDIS baseline publication of the Polar-orbiting Operational Environmental Satellite (POES) Ingestor to Preprocessor Interface Requirements in the Initial Joint Polar-orbiting Operational Satellite System (IJPS) time period. This document is Revision 0, DCN 0 (document number NOAA-POES-IJPS/OSD-2002-0014R0UD0).

This document identifies the new satellite data flows between the POES Ingestor and Preprocessor in the IJPS time period. The new functional requirements stated in this document provide the basis for further analysis and are documented in a detailed Interface Control Document between affected parties. Unless specifically cited in this document, the POES system operating with the NOAA-N and NOAA-N' satellites in the IJPS time period will continue to meet the baseline performance and quality requirements for the POES system.

Publication of this document closes Document Configuration Change Request (DocCCR) # DocCCR-POES-Other-2002-0007, entitled Acceptance of POES IJPS Ingestor to Preprocessor Interface Requirements Document.

Future updates and revisions to this document will be produced and controlled by NOAA/NESDIS.

NOAA/NESDIS
POES Series
P220

NOAA-POES-IJPS/OSD-2002-0014R0UD0
October 30, 2002
DCN 0

Table of Contents

List of Tables

List of Figures

NOAA/NESDIS
POES Series
P220

NOAA-POES-IJPS/OSD-2002-0014R0UD0
October 30, 2002
DCN 0

Acronyms

AD	Applicable Document
CCSDS	Consultative Committee for Space Data Systems
CDA	Command and Data Acquisition (Station)
CSC	Computer Sciences Corporation
CSDP	Central Satellite Data Processing
EPS	EUMETSAT Polar System
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FRAC	Full Resolution Area Coverage
GAC	Global Area Coverage
GDS	Global Data Stream
GFT	Generic File Transfer
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
OSDPD	Office of Satellite Data Processing and Distribution
PGD	Product Generation and Distribution
POES	Polar-orbiting Operational Environmental Satellite
RD	Reference Document
SAIP	Stored AIP
SOCC	Satellite Operations Control Center
V&V	Verification and Validation
VCDU	Virtual Channel Data Unit

1.0   Introduction

The National Oceanic and Atmospheric Administration (NOAA) has entered into an agreement with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for participation in the Initial Joint Polar-orbiting Operational Satellite System (IJPS) (hereinafter referred to as the "IJPS Agreement"). In the IJPS Agreement, NOAA and EUMETSAT agree to operate their Polar-orbiting satellites in a manner beneficial to both parties and the world's meteorological community.

The IJPS is comprised of two independent, but fully coordinated, polar satellite systems. Each independent system is comprised of two satellites flown consecutively under control of its respective ground segment. In support of the IJPS, NOAA satellites NOAA-N and -N' will be flown consecutively (N' replaces N) in a polar orbit with an afternoon equatorial crossing time. EUMETSAT, working together with the European Space Agency (ESA), will develop the Meteorological Operational (Metop) series of satellites to be flown consecutively in a Polar orbit with a mid-morning equatorial crossing time. The Metop satellites comprise the space segment of the EUMETSAT Polar System (EPS). The mid-morning and afternoon satellites will have a set of jointly provided common instruments, plus additional instruments specific to each orbit, provided by NOAA and EUMETSAT for their satellites. The IJPS Agreement also commits NOAA and EUMETSAT to supporting each other's operational satellite through their respective ground segments for commanding, receiving telemetry and global data, monitoring their respective satellite on-orbit status, and exchanging data between the two polar satellite systems.

NOAA's national and international commitments for providing global environmental data are the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS). NESDIS is responsible for establishing and operating civil operational environmental satellite systems while acquiring replacement satellites, launch vehicles and launch services through interagency agreements with the National Aeronautics and Space Administration (NASA).

The Office of Satellite Data Processing and Distribution (OSDPD), Information Processing Division (IPD) is responsible for ingesting and preprocessing data from both the morning and afternoon satellites, now and throughout the IJPS era.

1.1   Scope of Document

This document defines the interface requirements between the IJPS era Ingestor and the IJPS era Preprocessor, resulting from the introduction of new data streams from the IJPS era satellite instruments. This document identifies the interface requirements and upgrades that need to be made to the current KLM era Ingest to Preprocessing System (IPS).

In the IJPS era, the Ingestor (hardware and/or software) resides on a Front End Processor (FEP) within IPD's Central EnvironMental Satellite Computer System (CEMSCS), which will be a series of 6 Hewlett-Packard C6350 workstations.   The Preprocessor (several software applications are anticipated, one for each instrument – TBC) will reside on an IBM RS/6000/SP

under an AIX operating system. The actual design of the IJPS preprocessor is currently on-going.

1.2   System Overview

The POES Ingest system, within IPD, is responsible for acquiring a Time Division Multiplexed (TDM) Level 0 data, as a bit stream from the SOCC, and reformatting it into Level 1a data sets. The current Ingestors receive Level 0 High Resolution Picture Transmission (HRPT), producing a real time (up to 15 minute) Advanced Very High Resolution Radiometer (AVHRR) 1a data set, a Level 0 Local Area Coverage (LAC), producing a stored (up to 11 minute) AVHRR 1a data set and a Level 0 Global Area Coverage (GAC), producing both AVHRR 1a and Advanced Microwave Sounding Unit (AMSU) Instrument Processor (AIP) 1a orbital data sets. The current ingestors reside in redundant SGI (Unix Challenge DM) FEPs and write their output 1a data sets to an Amdahl GS-735 Enterprise Server (ES) operating under OS390. The current Preprocessors (one for AVHRR and one for AIP) reside on the ES.

In the IJPS era, it is anticipated that the data to be ingested from the NOAA POES satellites will be Level 0, TDM bit stream and the data to be ingested from the EPS Metop satellites will be Level 0 data in Consultative Committee for Space Data Systems (CCSDS) format arriving in transport packets called Virtual Channel Data Units (VCDUs). IPD's current goal is to replace the current FEPs and Ingestors, with a Commercial Off The Shelf (COTS) solution that will be able to handle both types of input Level 0 data streams.

1.3   Structure of the Document

- Section 1.4 – Introduces the document and scope of the interface requirements

- Section 1.5 – Lists the reference documentation

- Section 2 – Lists the applicable and reference documentation that provides additional information to the scope of requirements on the POES system

- Section 3 – Provides the interface requirements

- Section 4 – Provides how the section 3 requirements will be qualified or tested

- Section 5 – Provides traceability to Applicable Document (AD)-2

NOAA/NESDIS
POES Series
P220

NOAA-POES-IJPS/OSD-2002-0014R0UD0
October 30, 2002
DCN 0

1.4   Applicable and Reference Documentation

Tables 1-1 presents a list of Applicable Documents (AD-#) that contain information and/or requirements that need to be applied for the successful completion of the IJPS program. In case of conflict between requirements in this document and any listed applicable document, then this document takes precedence as the source for NOAA requirements. Table 1-2 presents a list of Reference Documents (RD-#) that provide additional useful information for successful program implementation.

Table 1-1. Applicable Documentation

Doc. #	Title	Reference Number	Issue	Date
AD-1	Polar-orbiting Operational Environmental Satellite Systems Requirements for the Initial Joint Polar-orbiting Operational Satellite System (IJPS), RDN-4	NO-IJ/OSD-2001-0004R0U0		15 Apr 2002
AD-2	IJPS System Requirements for the Ingest and Preprocessing System (IPS)	NOAA-POES/OSD-2001-0009R0UD0		30 Apr 2002
AD-3	Metop Space to Ground Interface Specification	MO-IF-MMT-SY0001	5, Rev. 0	17 Oct 2000
AD-4	HRPT/LRPT Direct Broadcast Services Specification	MO-DS-ESA-SY-0048	8	1 Nov 2000
AD-5	NOAA-NN' Satellite to Ground Interface		Initial Release	14 Aug 2000
AD-6	Initial Joint Polar-orbiting System (IJPS) Interface Control Document (ICD) for NOAA Level 1a and 1b Data		Final Draft	31 Oct 2000
AD-7	ASCAT Level 1 Product Format Specification	EPS/MIS/SPE/97231	4, Draft A	15 Nov 2000
AD-8	GOME-2 Level 1 Product Format Specification	EPS/MIS/SPE/97233	4, Draft A	15 Nov 2000
AD-9	GRAS Level 1 Product Format Specification	EPS/MIS/SPE/97234	4, Draft A	15 Nov 2000
AD-10	IASI Level 1 Product Format Specification	EPS/SYS/SPE/990003	4, Draft A	15 Nov 2000

Table 1-2. Reference Documents

Doc #	Title	Reference Number	Issue	Date
RD-1	Information Processing Division System Requirements Specification, IPD-SRS	IPD-1012	1	01 Oct 2001
RD-2	IPD Operations Concept Document	IPD-1013	1	12 Mar 2002

2.0   Requirements

2.1   Interface Identification and Diagrams

IR-ING-PPP-3.1.1-10

The Ingestor shall ingest the EPS Global Data Stream (GDS), via the IJPS Communications Element, as VCDUs in CCSDS format and output instrument level 1a granules for the common instruments contained within. This implies that the ingestor can "filter out" the non-common instruments. These instrument Level 1a data sets shall be provided to the preprocessor in pipeline mode (i.e. as granules – which are defined as a portion of an orbit).

IR-ING-PPP-3.1.1-20

The Ingestor shall ingest blind orbit TDM formatted GAC, in pipeline mode from SOCC, and output instrument Level 1a granules.

IR-ING-PPP-3.1.1-30

The Ingestor shall ingest Metop HRPT (MHRPT) data as VCDUs in CCSDS format and output selected instrument Level 1a granules.

IR-ING-PPP-3.1.1-40

The FEP shall receive from the EPS, via the IJPS Communications Element, Level 1 data for the unique Metop instruments (IASI, GOME, GRAS & ASCAT). These data shall be then made available to the product applications that desire them (via an FTP site – TBD).

Note: There is a possible requirement to provide the IASI 1c data to a "filter" application to reduce it down to TBD channels.

IR-ING-PPP-3.1.1-50

The Ingestor shall also output data received from nominal NOAA-N & -N' orbits as instrument Level 1a granules to reduce the amount of preprocessor code to be maintained.

Note: As mentioned above a granule is defined as a portion of an orbit, the size of that portion is TBD. Therefore a granule could be anything from a scan line to an entire orbit.

IR-ING-PPP-3.1.1-60

The Ingestor shall process 99.8% of data received within any given 30-day period.
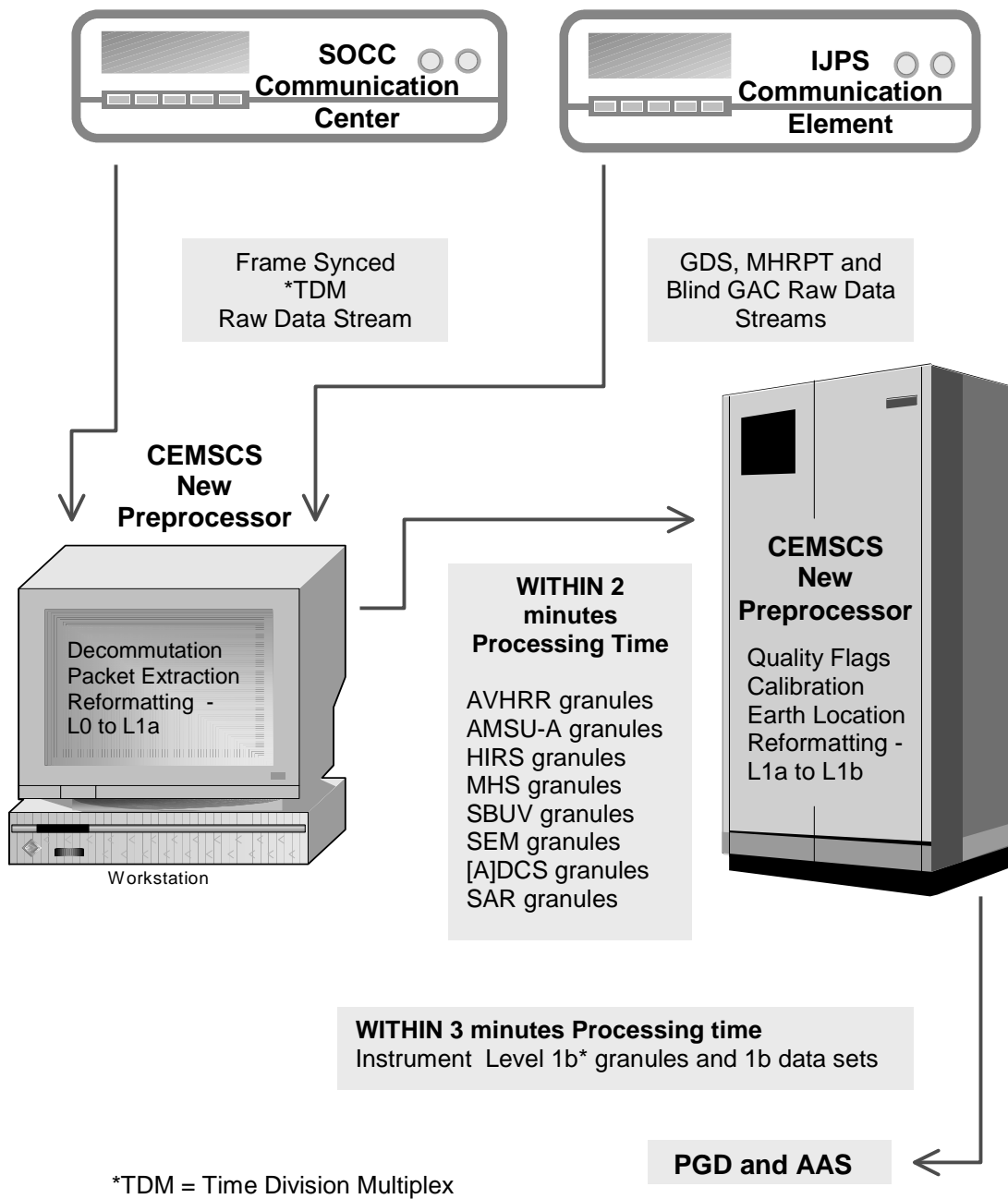
SOCC
Communication
Center

IJPS
Communication
Element

Frame Synced
*TDM
Raw Data Stream

GDS, MHRPT and
Blind GAC Raw Data
Streams

**CEMSCS
New
Preprocessor**

Decommutation
Packet Extraction
Reformatting -
L0 to L1a

Workstation

**WITHIN 2
minutes
Processing Time**

AVHRR granules
AMSU-A granules
HIRS granules
MHS granules
SBUV granules
SEM granules
[A]DCS granules
SAR granules

**CEMSCS
New
Preprocessor**

Quality Flags
Calibration
Earth Location
Reformatting -
L1a to L1b

WITHIN 3 minutes Processing time
Instrument Level 1b* granules and 1b data sets

PGD and AAS

*TDM = Time Division Multiplex

Figure 2-1. IJPS Era Ingest and Preprocessing Flow

3.0 Qualification/Test

The qualification test for requirement IR-ING-PPP-3.1.1-10 will be done by Demonstration. A simulated GDS will be fed into the new Ingestor, selecting certain instruments to be filtered out, then the instrument Level 1a data sets generated will be analyzed for accuracy.

The qualification test for requirement IR-ING-PPP-3.1.1-20 will be done by Demonstration. In cooperation with SOCC, a NOAA-16 GAC will be fed to the Ingestor in pipeline mode, then the instrument Level 1a data sets generated will be analyzed for accuracy.

The qualification test for requirement IR-ING-PPP-3.1.1-30 will be done by Demonstration. A simulated MHRPT will be fed into the new Ingestor, selecting certain instruments to be filtered out, then the instrument 1a data sets generated will be analyzed for accuracy.

The qualification test for requirement IR-ING-PPP-3.1.1-40 will be done jointly with EUMETSAT when the unique instrument Level 1 data sets are available. Currently the requirement is that they will be received and put on an FTP site.

The qualification test for requirement IR-ING-PPP-3.1.1-50 will be done by Demonstration. A NOAA-16 GAC will be fed to the Ingestor, then the instrument 1a granules generated will be analyzed for accuracy.

The qualification test for requirement IR-ING-PPP-3.1.1-60 will be done by analysis. All data received will be compared with the Level 1a output data sets for completeness.

4.0   Requirements Traceability

Requirement ID	Requirement Statement (from Section 3.0 above)	Source Requirement (from AD-2)	Verification Method	Comments
IR-ING-PPP-3.1.1-10	The Ingestor shall ingest the EPS Global Data Stream (GDS), via the IJPS Communications Element, as VCDUs in CCSDS format and output instrument Level 1a granules for the common instruments contained within. This implies that the ingestor can "filter out" the non-common instruments. These instrument Level 1a data sets shall be provided to the preprocessor in pipeline mode.	IPS-3.1.1-10 IPS-3.1.2-10 IPS-3.1.2-40	Demo	
IR-ING-PPP-3.1.1-20	The Ingestor shall ingest blind orbit TDM formatted GAC, in pipeline mode from SOCC, and output instrument Level 1a granules.	IPS-3.1.1-20 IPS-3.1.2-20 IPS-3.1.2-60	Demo	
IR-ING-PPP-3.1.1-30	The Ingestor shall ingest Metop HRPT (MHRPT) data as VCDUs in CCSDS format and output selected instrument 1a granules.	IPS-3.1.1-40 IPS-3.1.2-30	Demo	
IR-ING-PPP-3.1.1-40	The FEP shall receive from the EPS, via the IJPS Communications Element, Level 1 data for the unique Metop instruments (IASI, GOME, GRAS & ASCAT). These data shall be then made available to the product applications that desire them (via an FTP site – TBD).	IPS-3.1.1-80	Demo	
IR-ING-PPP-3.1.1-50	The Ingestor shall also output data received from nominal NOAA-N & -N' orbits as instrument Level 1a granules to reduce the amount of preprocessor code to be maintained.	IPS-3.1.2-50	Demo	
IR-ING-PPP-3.1.1-60	The Ingestor shall process 99.8% of data received within any given 30 day period.	IPS-3.3.1-10	Analysis	

5.0 Definitions

Granule – Up until now, even though we define an IJPS Granule as a portion of an orbit, it has been thought of as a small "file". This may not necessarily be true. A granule can be a portion of an orbit that is passed on in memory, like "message passing" or via a client-server type of data transfer. Until prototyping and the design is finished a granule is just a portion of an orbit, what size portion and how it will appear is still TBD.

Pipeline mode – a processing mode that compensates for limited communication bandwidth. It pertains to a chain of processors that are applied in sequence to orbital data. In pipeline mode, at any given moment, each of the processors works on a different piece (referred to as a granule) of the orbital data set, typically on the granule that was just completed by the preceding processor in the sequence.

NOAA/NESDIS
POES Series
P220

NOAA-POES-IJPS/OSD-2002-0014R0UD0
October 30, 2002
DCN 0

Distribution List

Loc. No.	Organization	Name	Address	Copies
National Oceanic and Atmospheric Administration (NOAA)				
NOAA Library and Floor Locations				
001	NOAA OSD Library	c/o Verna Cauley	FB 4, Room 3307	1
002	NOAA/SOCC Library	c/o Rick James	FB 4, Room 0110/0129	2
003	WCDAS Library	c/o Jim Sheridan	Wallops, VA	2
004	FCDAS Library	c/o Lance Seman	Fairbanks, AK	1
037	POES System Lead	Dong Han (Acting)	FB 4, Room 0110	1
OSD				
010	NOAA/OSD3	Richard G. Reynolds	FB 4, Room 3308C	1
078	NOAA/OSD	Michael Mignogno	FB-4, Room 3301	1
163	NOAA/OSD3	Kirk Liang	FB-4, Room 3308E	1
166	NOAA/OSD	James Silva	FB-4, Room 3301E	1
296	NOAA/OSD	Thomas Schott	FB-4, Room 3301	1
OSDPD				
297	NOAA/OSDPD	Helen Wood	FB-4, Room 0201	1
307	NOAA/OSDPD	Alexander Kidd	Camp Springs, MD	1
298	NOAA/OSDPD	Mike Matson	FB-4, Room 0201	1
OSDPD/IPD				
299	NOAA/OSDPD/IPD	Barbara Banks	FB-4 Room 0301	1
189	NOAA/OSDPD/IPD	Michael Kane	FB-4, Room 3065	1
300	NOAA/OSDPD/IPD	Mac McCreary	FB-4, Room 2322	1
301	NOAA/OSDPD/IPD	Vincent Tabor	FB-4, Room 0318	1
302	NOAA/OSDPD/IPD	Cathy Nichols	FB-4, Room 0313	1
NOAA / Support Contractors				
187	NOAA/OSDPD/CSC	David Morel	FB-4, Room 0323	1
094	NOAA/OSD/CSC – CMO	David Dutcher	FB 4, Room 3311	1
098	NOAA/OSD/CSC – DCO	Elizabeth Smith	FB 4, Room 2326	2
173	NOAA/OSD/CSC – Editor	Kelly Coleman	FB 4, Room 3317	1
NOAA / Systems Contractors				
310	NOAA / Mitretek Systems	Stacy Bunin	FB-4, Room 3318	1
			Total	**26**